



Armed Forces College of Medicine AFCM





Visceral pain sensation

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INTENDED LEARNING OBJECTIVES (ILOs)



By the end of this lecture the student will be able to:

- ✓ Identify characteristics of visceral pain.
- ✓ List the causes of visceral pain
- ✓ Define referred pain
- ✓ Identify examples of referred pain
- ✓ Explain mechanisms of referred pain



Lecture Plan



Part 1: Introduction to visceral pain

Part 2: Main Lecture topics

- o Visceral Pain
- o Referred Pain

Part 3: Summery

Lecture Quiz



Visceral pain sensation



➤ **Definition:** It is a slow type of pain that arise from the viscera.

➤ **Visceral nociceptors:**

Visceral pain receptors are **few** in most of the viscera, so **localized damage** e.g. (**sharp cut in the viscera does not produce pain**). However, widespread inflammation, ischemia, mesenteric stretching, or spasm or dilatation of hollow viscera produce pain.

Some viscera are pain insensitive

Liver parenchyma. Lung alveoli.

Bone.

Brain.

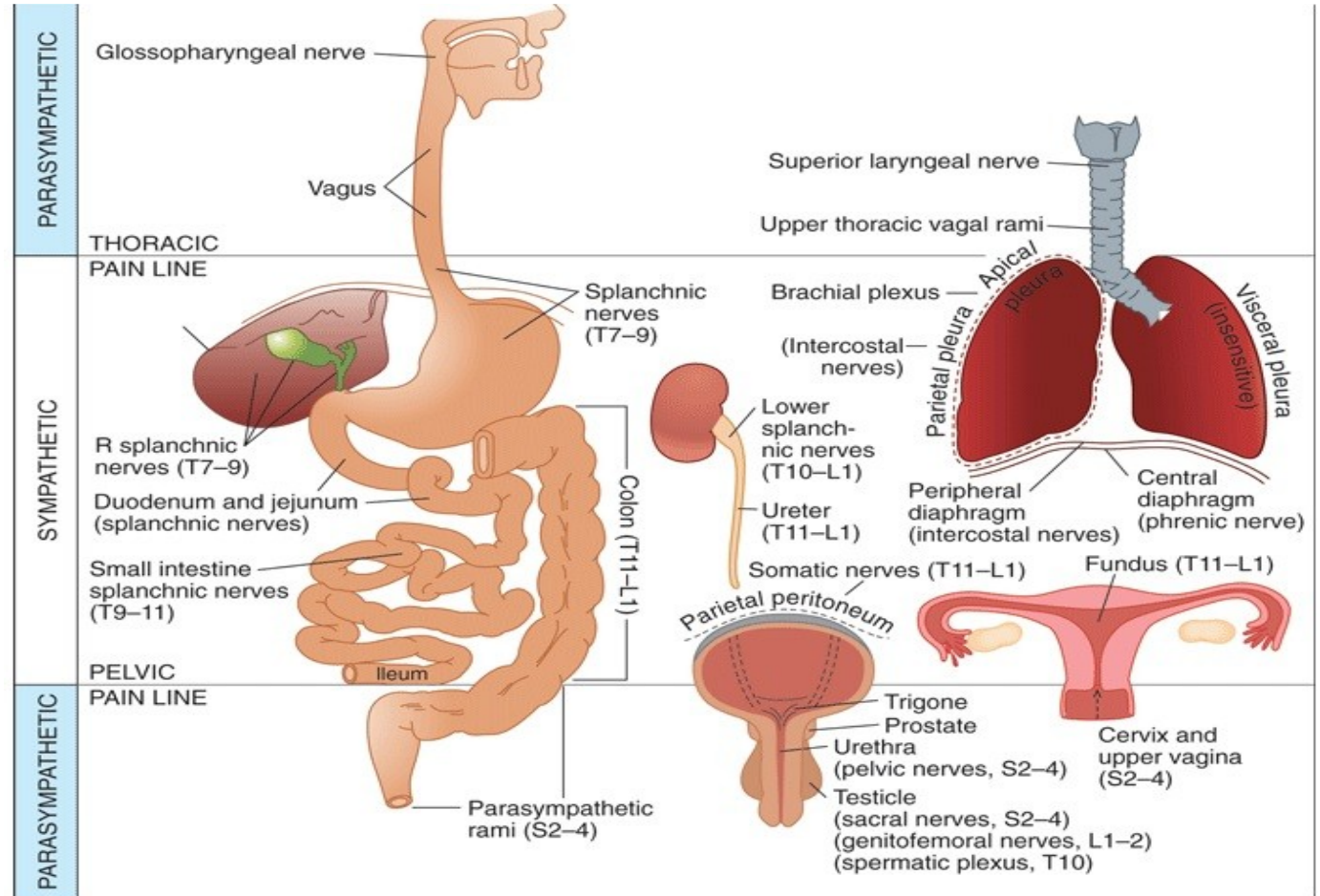


Visceral pain sensation



Neural pathway.

Unmyelinated type C afferent fibers by autonomic nervous system



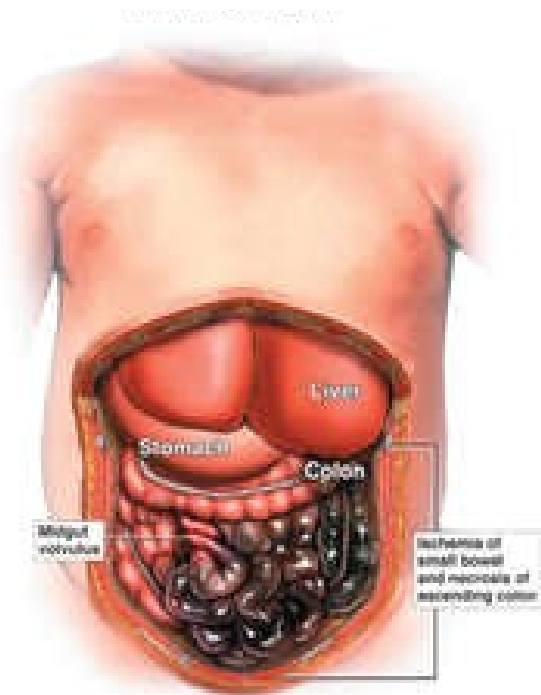
Ganong's Review of Medical Physiology Twenty-Third Edition, 2010



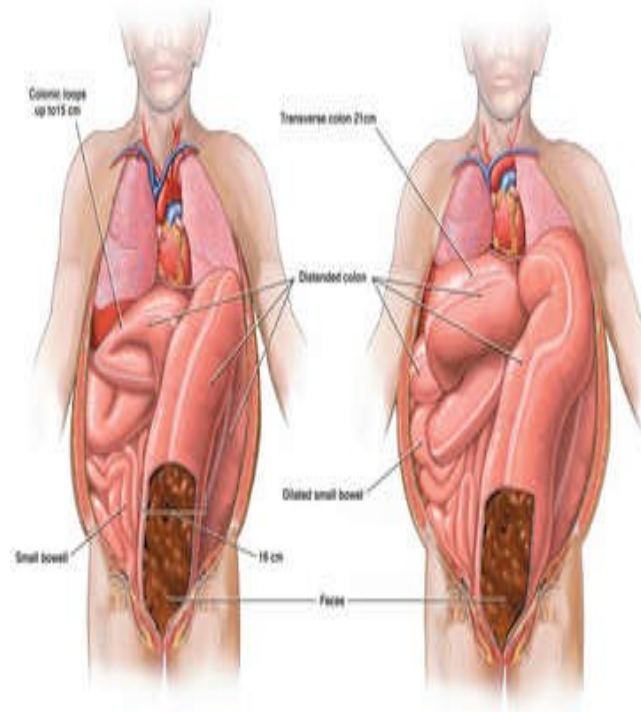
Common causes of visceral pain are:



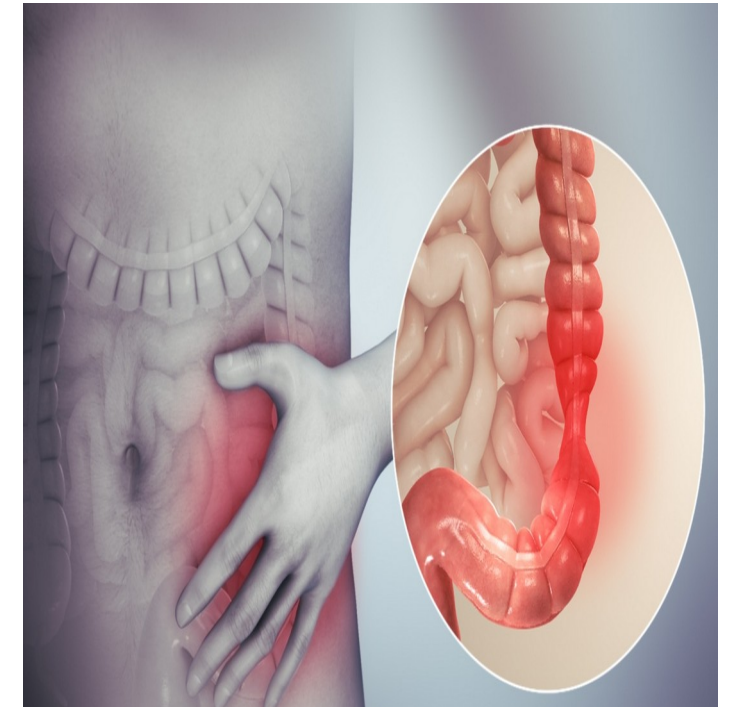
Ischemia



Over-distension of hollow viscera



Spasm of hollow viscus



<https://ebSCO.smartimagebase.com>

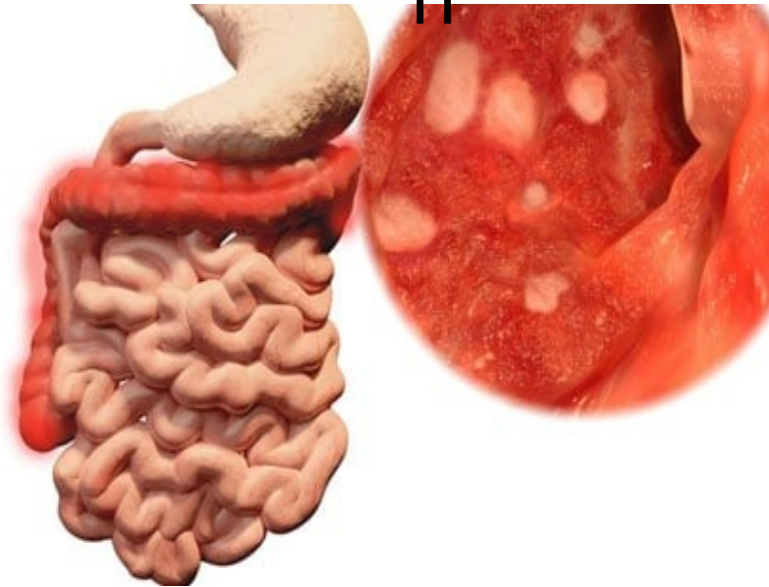
<http://www.scientificanimations.com/wiki-images/>



Common causes of visceral pain are:

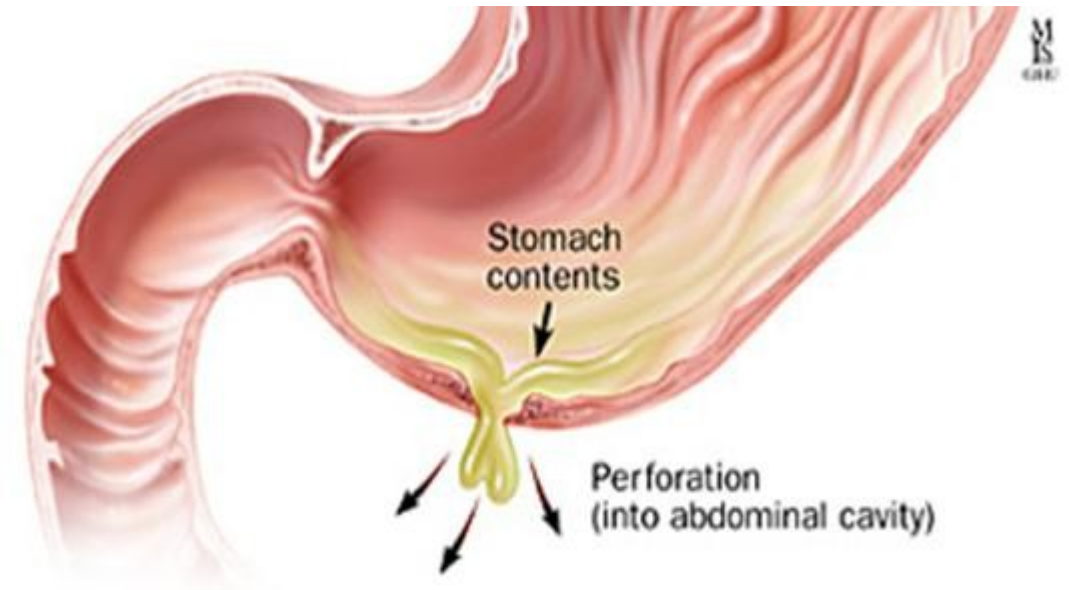


Inflammation



<https://www.rosenfeldinjurylawyers.com/ulcerative-colitis.html>

Chemical irritation



http://intranet.tdmu.edu.ua/data/kafedra/internal/vnutrmed2/classes_stud/en/med/lik/ptn/Internal%20medicine/4%20course/09.%20Ulcer%20disease.%20Other%20peptic%20ulcers%20of%20stomach%20and%20duodenum.htm



Characteristics of visceral pain are:

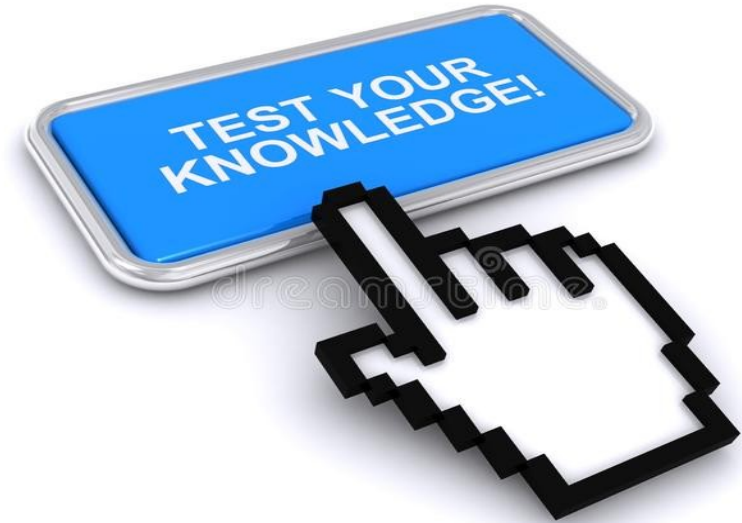


- ❑ Slow pain conducted by **C nerve** fibers transmitted to the higher centers through paleospinothalamic (Lateral spinothalamic) tract
- ❑ Diffuse (poorly localized), because pain receptors in viscera are comparatively few.
- ❑ Dull aching pain.
- ❑ Associated with:
 - o Autonomic symptoms in the form of nausea, vomiting, profuse sweating and lowering of blood pressure and heart rate.
 - o Reflex contraction of skeletal muscle of abdominal wall over the inflamed viscera "guarding rigidity".
 - o Emotional manifestation in form of depression.
 - o Referred to other site.



Complete

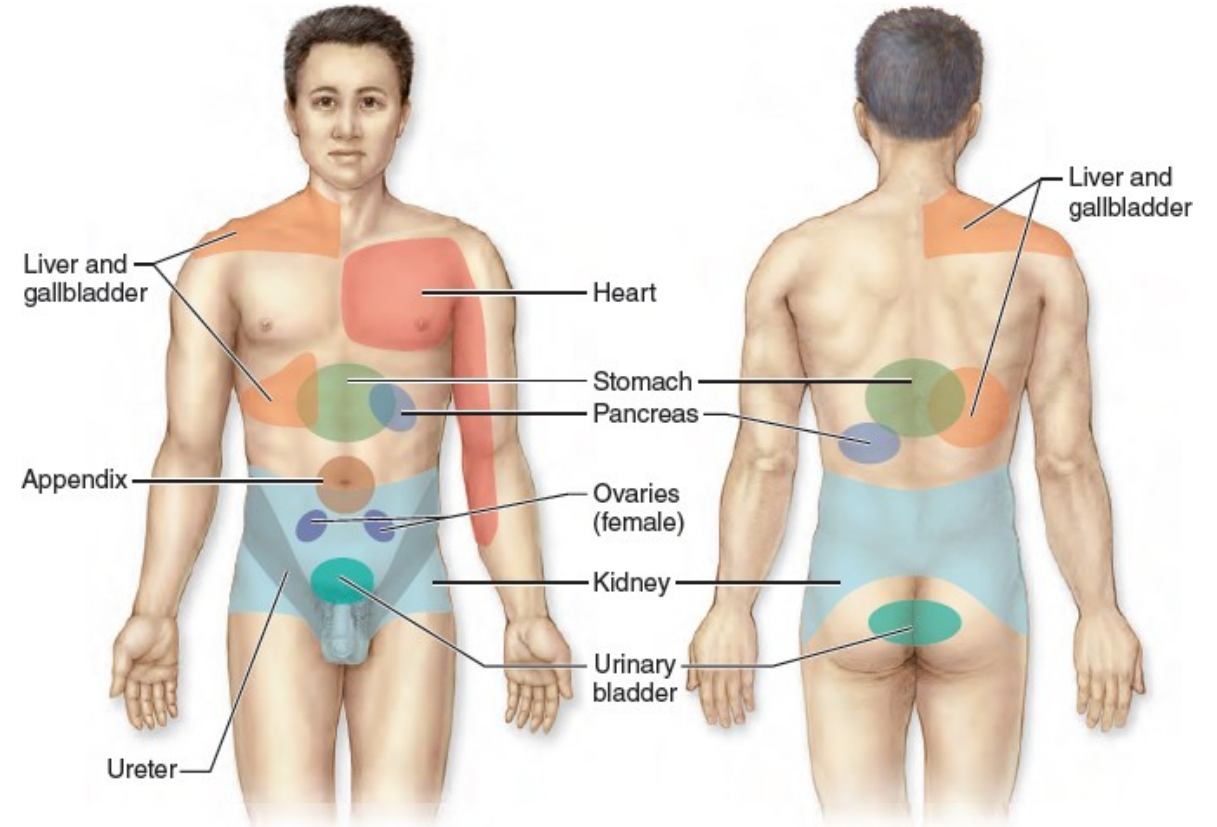
From causes of visceral pain Ischemia, inflammation, Spasm of hollow viscus
Chemical irritation and Overdistension of hollow viscera





Referred pain

Referred pain is that pain which originates due to irritation of a visceral organ and is felt **not** in the organ but in some other somatic structure (usually skin) supplied by the same neural segment (pain felt away from its original site).



http://textflow.mheducation.com/figures/1259116115/mck54615_1605_lg.jpg





Referred pain

Pain is usually referred to a structure with common embryonic origin and hence is innervated by a common neural segment. This principle is called the **dermatomal rule**. For example, embryologically, the heart and the left arm have the same segmental origin

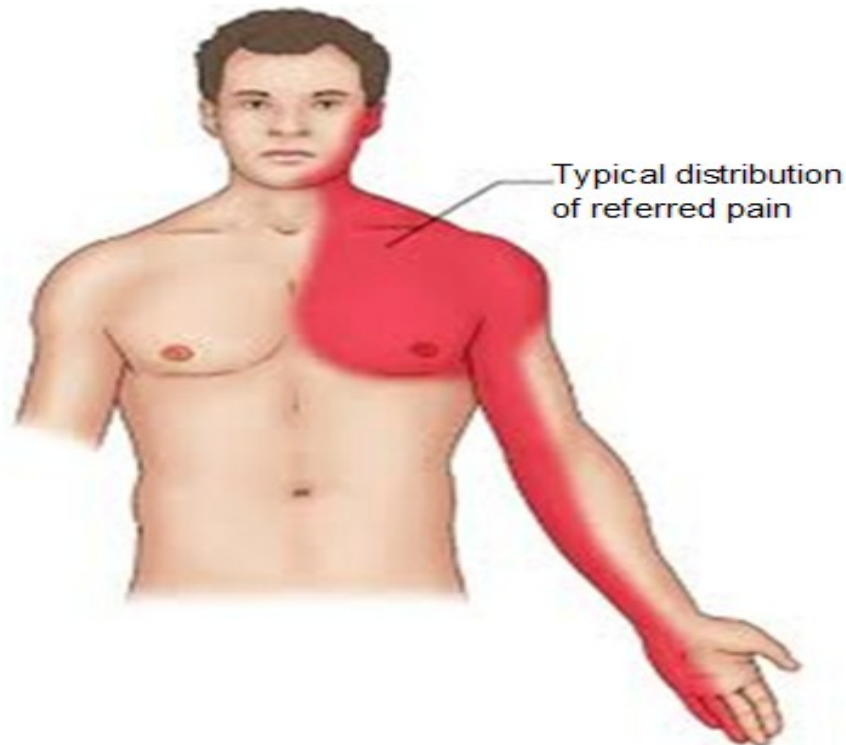
Later when the disease process spreads to e.g. the parietal peritoneum which is supplied with extensive pain innervations from the peripheral spinal nerves the Pain will be of sharp and localized directly over the irritated peritoneum where the inflamed viscus touches or is adherent to the abdominal wall (**parietal pain**).



Examples of referred pain are:

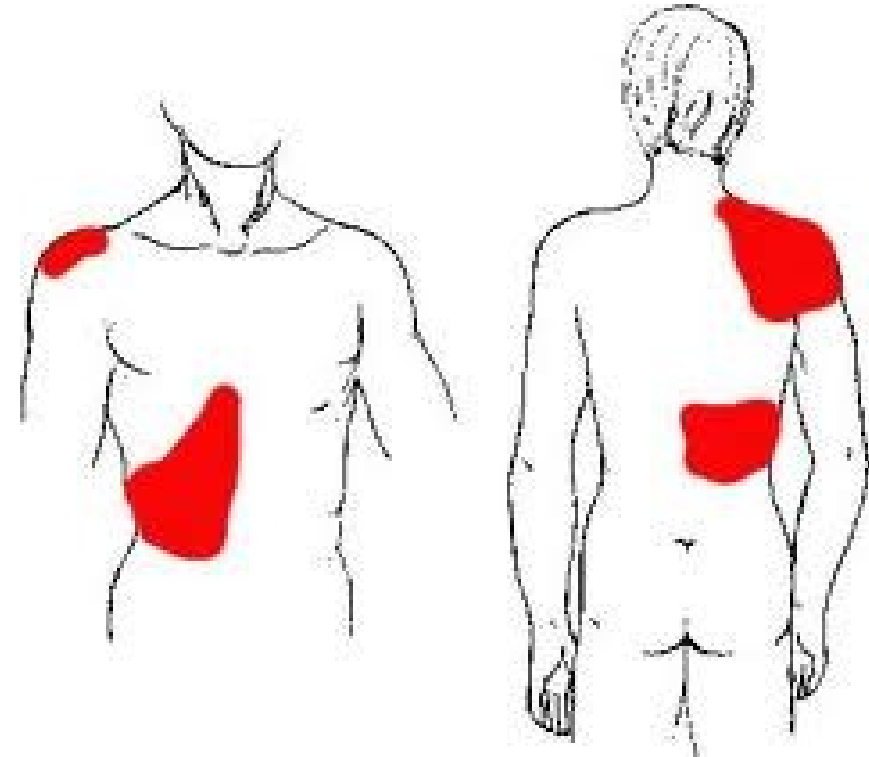


Myocardial ischemia (Angina)



<http://heartdiseasesncure.blogspot.com/2016/07/what-is-heart-attack.html>

Pain from gall bladder



<https://www.drgangemi.com/health-articles/digestive-health/gallbladder-referred-pain-constipation/>



Examples of referred pain are:



Pain from appendicitis

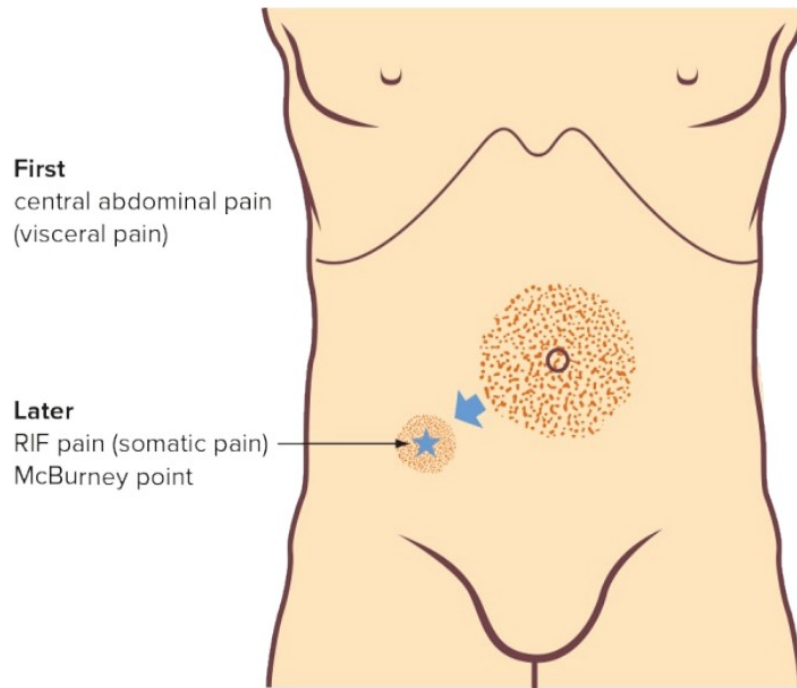


FIGURE 34.8 Typical pain distribution of acute appendicitis

John Murtagh's General Practice,
7th edition, 2018, McGraw-Hill
Education

Pain from kidney

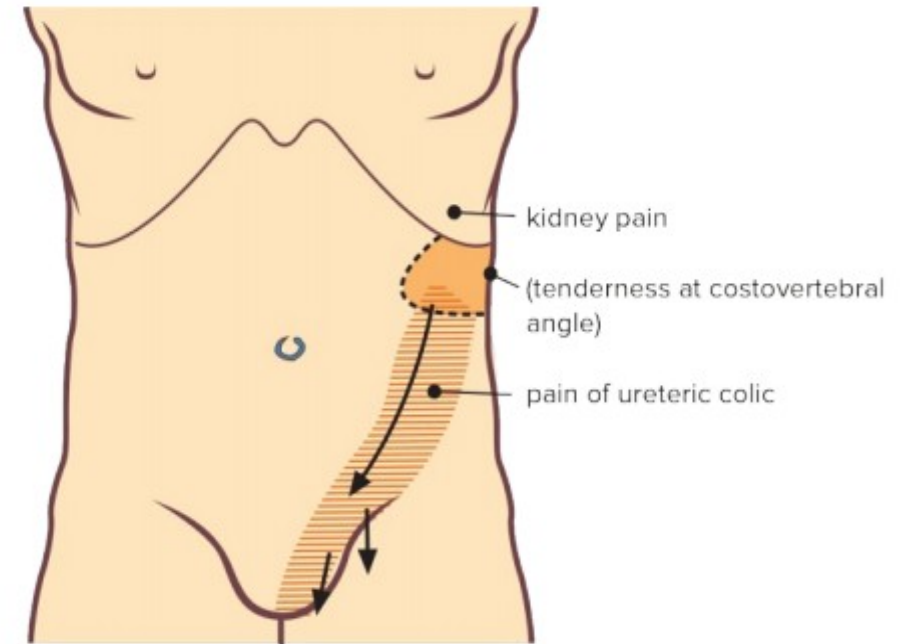


FIGURE 34.13 Ureteric colic: typical radiation of pain in left ureteric colic

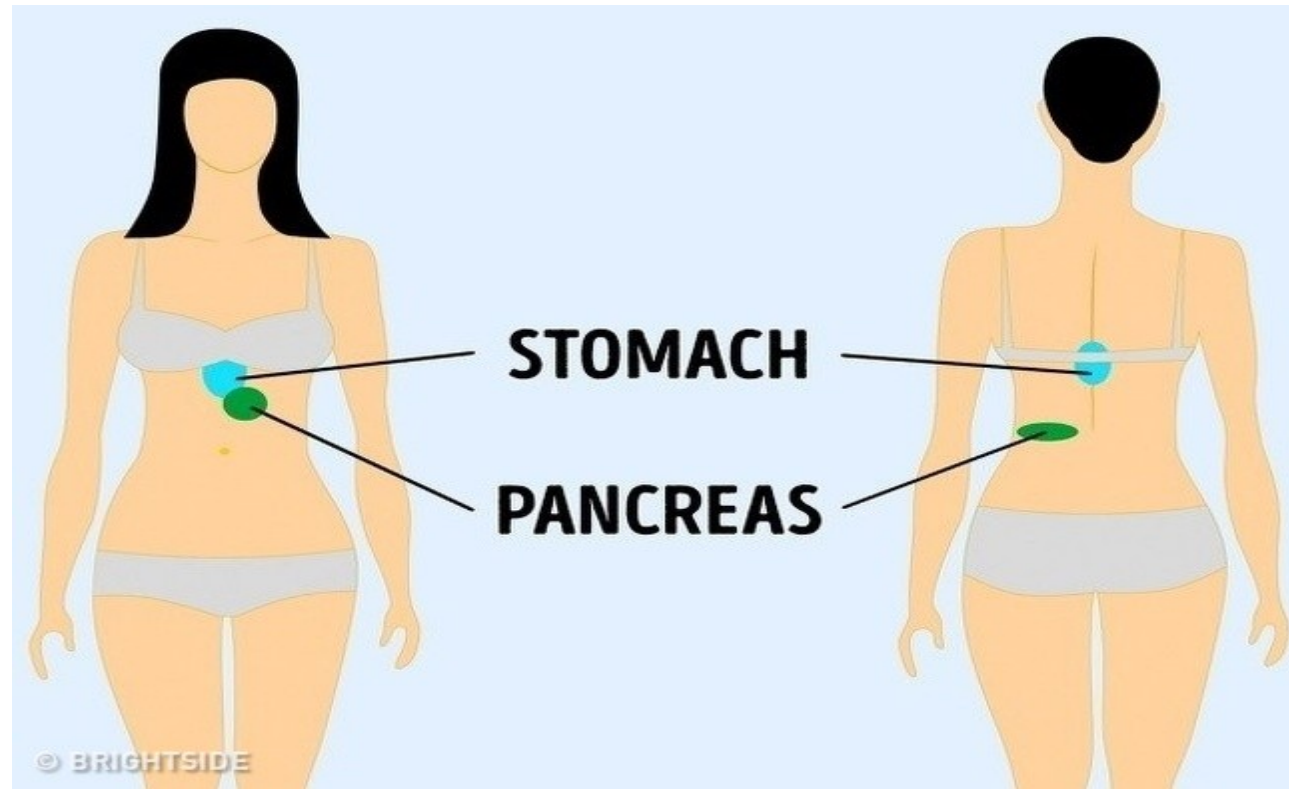
John Murtagh's General Practice,
7th edition, 2018, McGraw-Hill
Education



Examples of referred pain are:



Pain from stomach and pancreas



<https://brightside.me/inspiration-health/9-types-of-referred-pain-that-can-be-dangerous-if-ignored-477710/>



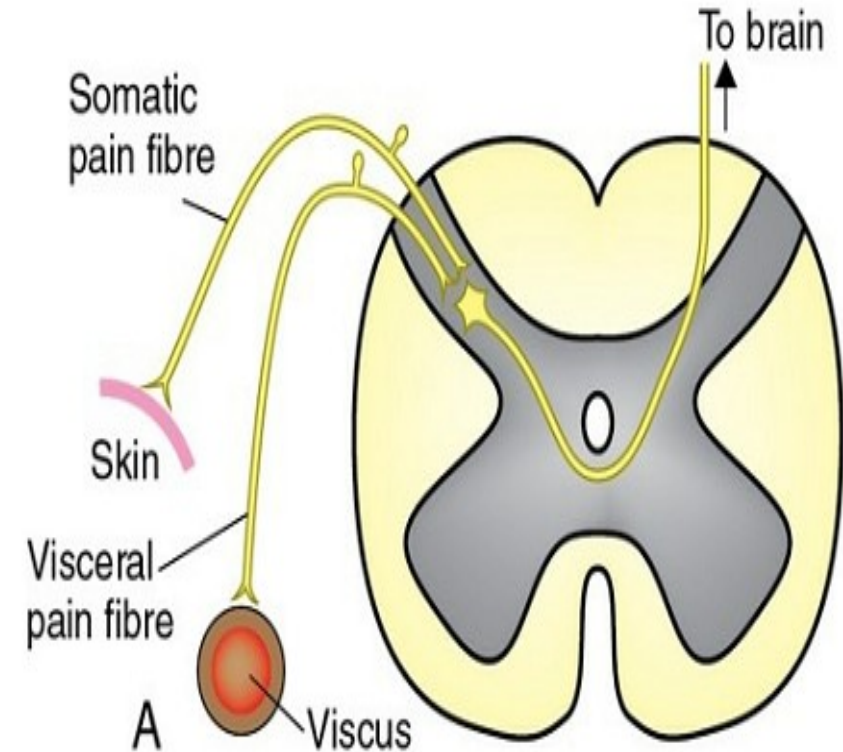
Theories of referred pain are:



1. Convergence projection theory:

the afferent pain conducting neuron from a somatic area and a visceral organ **converge** on a **common** second-order neuron in the paleospinothalamic tract.

Since somatic pain is far more common, the brain **projects** all pain as somatic pain even when the source is actually visceral.



Textbook of Medical Physiology, SECOND EDITION, Indu Khurana, MD, 2015, Elsevier



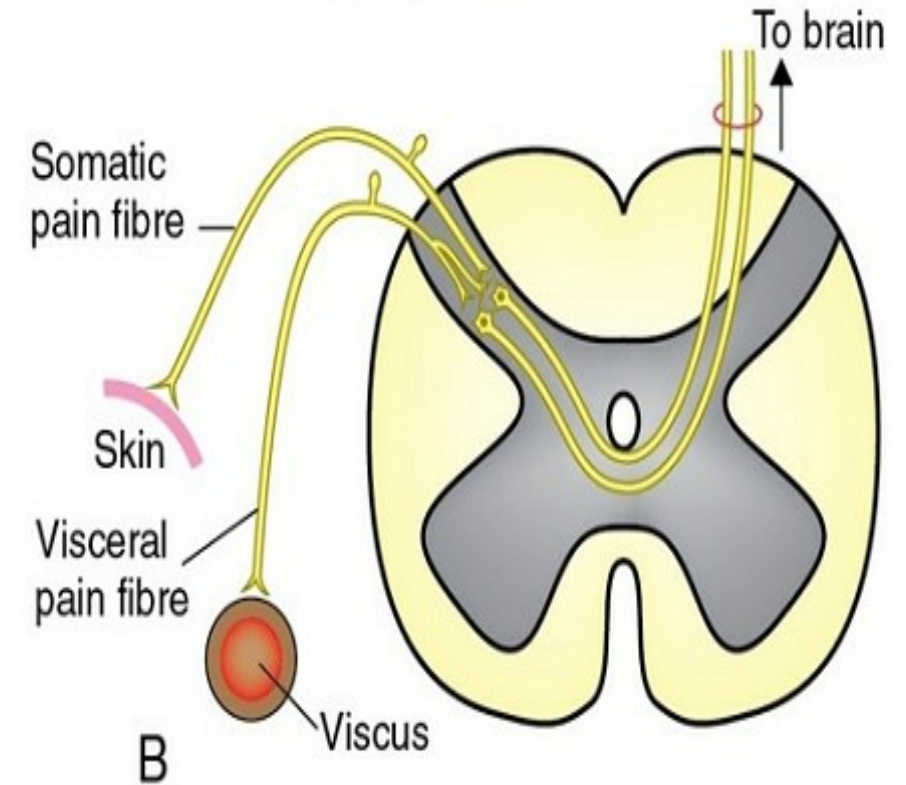
Theories of referred pain are:



2. Facilitation theory:

The visceral irritation is **inadequate** for producing pain by itself.

However, it **facilitates** pain fibers from somatic structures, so that even **minor somatic irritation** produces perceptible **pain**.



Textbook of Medical Physiology, SECOND EDITION, Indu Khurana, MD, 2015, Elsevier



Complete:

A patient suffers from pain referred to left shoulder and inner side of the arm, the cause of this pain is myocardial ischemia and this could be explained by convergence projection theory or facilitation theory



Summary



Visceral pain is **slow** type of pain, transmitted by **C** fiber, reach the higher centers via **Lateral spinothalamic** tract (paleo spinothalamic tract).

Visceral pain characterized by **diffuse**, **dull aching** pain, associated with **autonomic manifestation**, **grading rigidity**, **emotional manifestation** and usually **referred to skin**

Referred pain is pain **felt away** from its original site, referred to skin having the **same embryological origin** as the diseased viscera.

Cause of pain	Referred site
Myocardial ischemia	Left shoulder and the inner side of the left arm.
Gall bladder	The tip of the right shoulder.
Appendicitis	Around the umbilicus
Kidney	The back and radiate as ureter to the corresponding testis and inner thigh
Stomach	Epigastric region
Pancreas	The back





1- Which of the following is the original site of pain referred to area around the umbilicus?

- A. Pancreases.
- B. Heart.
- C. Gall bladder.
- D. Appendix.
- E. Kidney.





2- Which of the following is a character of visceral pain?

- A. It is unpleasant localized type of pain.
- B. It is transmitted by AB fibres.
- C. It reaches the cortex via the anterior spinothalamic tract.
- D. It is usually referred to the skin.
- E. It is fast pain.



SUGGESTED TEXTBOOKS



1. Ganong's Review of Medical Physiology, twenty-fifth edition 2016, McGraw-Hill Education, chapter 8, from page 159 to 175.
2. Guyton and Hall textbook of medical physiology, thirteenth edition 2016, Elsevier, chapter 49, from page 626 to 628.



Thank You

